Glen Canyon Dam Beach/Habitat-Building Flow Symposium

April 8 - 10, 1997

Flagstaff, Arizona

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Glen Canyon Dam Beach/Habitat-Building Flow Symposium

April 8 - 10, 1997
Flagstaff, Arizona

Convened by the Grand Canyon Monitoring and Research Center, Department of the Interior, Flagstaff, Arizona, Lawrence D. Garrett, Chief.

To Honor

The work performed to produce "The Operation of Glen Canyon Dam Final Environmental Statement" and the execution of the 1996 Beach/ Habitat-Building Flow, plus scores of other projects, is a lasting tribute to the men and women of the former **Glen Canyon Environmental Studies**. With commitment unmatched, these skilled individuals opened the way for the Grand Canyon Monitoring and Research Center and other agencies to use scientific management to protect and improve the wondrous Grand Canyon river ecosystem. We stand in their shadow.

If I have seen further it is that I stand on the shoulders of Giants.

–English mathematician and physicist, Sir Isaac Newton

Symposium Program Overview

	Tuesday, April 8, 1997
8:00 - 8:30	Opening Remarks
	Physical System Component
8:30 - 9:50	Hydrology and Sediment
9:50 - 10:00	Break
10:00 - 12:00	Hydrology and Sediment continued
12:00 - 1:30	Lunch
	Aquatic System Component and Trophic Linkages
1:30 - 3:10	Aquatic Biology
3:10 - 3:20	Break
3:20 - 4:20	Backwaters
4:20 - 5:20	Fishes
	Wednesday, April 9, 1997
	Terrestrial System Component
8:00 - 9:30	Terrestrial Biology
	Cultural, Recreational and Economic Component
9:30 - 10:30	Cultural Issues
10:30 - 10:40	Break
10:40 - 11:40	Recreational Issues
11:40 - 12:00	Economic Issues
12:00 - 1:30	Lunch (Big Noodle Day in Sakura's)
	Executive Sessions: Synthesis Preparation
1:30 - 5:00	Executive Sessions: Synthesis Preparation
	Thursday, April 10, 1997
8:00 - 8:15	Western Riverine Issues
8:15 - 8:30	The Flood Experiment, Perspectives for the future
	Core-Topic Synthesis Presentations
8:30 - 10:10	Synthesis Group Presentations
10:10 -10:20	Break
10:20 - 12:00	Synthesis Group Presentations continued
12:00 - 1:00	Lunch
	Workshop Phase
1:00 - 3:00	Discussion Groups
3:00 - 3:15	Break
3:15 - 4:25	Discussion Group 10-minute Summaries
4:25 - 4:40	Closing Remarks

Grand Canyon Monitoring and Research Center
Mission Statement

The mission of the Grand Canyon Monitoring and Research Center is to develop and administer plans for long-term monitoring and research of the Colorado River and its riverine environment that responds to the short and long term operation of the Glen Canyon Dam as specified in the Grand Canyon Protection Act of 1992 and Glen Canyon Dam Environmental Impact Statement of 1995. The mission is limited in scope to those factors that are affected by operation of Glen Canyon Dam.

The Center is to be guided by research needs specified by the Department of the Interior's Secretary-appointed Adaptive Management Work Group (AMWG); a Technical Work Group (TWG); Independent Science Review Group (ISRG); a Federal Agencies Cooperative Action committee with representation from the National Park Service, Bureau of Reclamation, Fish and Wildlife Service, Department of Energy; Indian tribes; state governors and agencies; power customers; environmental; commercial and other associated interest groups.

The Grand Canyon Monitoring and Research Center shall establish and implement long-term monitoring programs and activities that will ensure that Glen Canyon Dam is operated in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Areas were established.

The Canyon is at least two things beside spectacular; it is a biological unit and a most revealing single page of earth's history anywhere open on the face of the globe.

–Joseph Wood Krutch

Purpose of this Symposium

This symposium presents an exciting opportunity for you to learn and to share. During these three days, the Glen Canyon Dam Beach/Habitat-Building Flow Symposium serves as a focal point for education and interaction among the scientific community, resource managers, and the public.

The symposium begins with the presenters addressing the hypotheses used in their studies, why they selected those hypotheses, what were the results and implications of the findings, and how they linked to other resources. During the afternoon of the second day, the Executive Sessions: Synthesis Preparation groups will meet to discuss how results can be integrated with regards to impacts on resources.

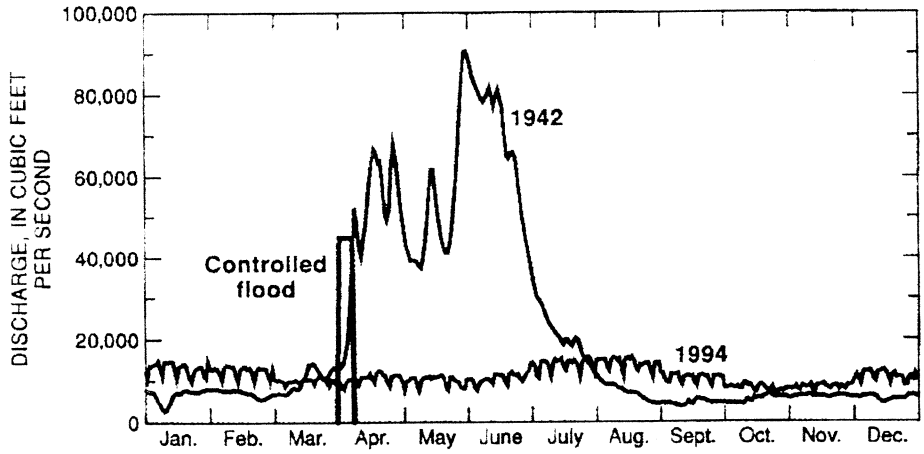
The third day highlights the synthesis work group presentations to stakeholders and the general public, followed in the afternoon with discussions among resource experts regarding the implications of the flood experiment among resources. Symposium attendees are encouraged to participate in discussion groups to better understand the implications of the findings.

The *ultimate* goal of this workshop phase is to report recommendations solicited from discussion groups on how best to use the scientific results from the flood. Recommendations will be useful to guide the future monitoring and research efforts of the Center within the river corridor. To realize this purpose, you are asked to attend at least the Thursday morning program in preparation for the afternoon discussion groups, though attending the entire symposium is preferable. Please prepare your questions and thoughts based on your interests and background with the Grand Canyon river ecosystem. Thank you for attending and participating in this landmark event.

Environmental Impact Statement Reasons and Objectives for Conducting Beach/Habitat-Building Flows

–From *Operation of Glen Canyon Dam: Final Environmental Impact Statement*, 1995

- EIS Objective: Redeposition of high elevation sand, followed by decreasing erosion rates
- EIS Objective: Preserve and restore camping beaches
- EIS Objective: Flush non-native fishes
- EIS Objective: Rejuvenate backwater habitat for native fishes
- EIS Objective: Maintain open sandbars for camping (scour New-High-Water-Zone vegetation)
- EIS Objective: Provide water to Old-High-Water-Zone vegetation
- EIS Objective: Protect cultural resources
- EIS Objective: Meet objectives without significant adverse impacts to: endangered species; cultural; trout fishery and economics



The 1996 experimental flow released 409,000 acre feet of water from Lake Powell.

– Bureau of Reclamation Report #EC-97-01.

Tuesday, April 8, 1997

San Francisco Ballroom

8:00-8:15	*Opening Remarks* - Denny Fenn, US Geological Survey, Biological Resource Division
8:15-8:30	*Integrated research and the experimental flood: Background, objectives, design and implementation* - Duncan Patten, Arizona State University

PHYSICAL SYSTEM COMPONENT
Tim Randle and Jim Smith, Session Chairpersons

Hydrology and Sediment

8:30-8:50	*Effects of the 1996 experimental flood on water quality of Lake Powell and the Colorado River* - Bill Vernieu, Grand Canyon Monitoring and Research Center
8:50-9:10	*Reworking of aggraded debris fans by the 1996 Glen Canyon Dam Beach/Habitat-Building Flow on the Colorado River in Grand Canyon* - Ted Melis, US Geological Survey, Water Resource Division
9:10-9:30	*Mainstem dye study* - Julie Graf, US Geological Survey, Water Resource Division
9:30-9:50	*Main channel streamflow-Development of predictive methods* - Eleanor Griffin, US Geological Survey, Water Resource Division
9:50 - 10:00	Break
10:00-10:20	*Pre- vs. Post-flood sandbar mapping and sedimentology* - Jack Schmidt, Utah State University
10:20-10:40	*Sandbar sedimentology and mainstem sediment distribution* - Dave Rubin, US Geological Survey, Water Resource Division
10:40-11:00	*Main channel, eddy, and eddy deposits responses* - Matt Kaplinski, Northern Arizona University
11:00-11:20	*Main channel sediment transport and storage change: Development to predictive methods* - Jim Smith, US Geological Survey
11:20-11:40	*Main channel sediment transport and flow at the Grand Canyon Gauge* - Dave Topping, US Geological Survey, Water Resource Division
11:40-12:00	*Topographic evolution of sand bars in lateral separation eddies in Grand Canyon during the 1996 experimental flood* - Ned Andrews, US Geological Survey
12:00 - 1:00	Lunch

AQUATIC SYSTEM COMPONENT AND TROPHIC LINKAGES
Barry Gold, Session Chairperson

	Aquatic Biology
1:00-1:20	*Flood effects on benthic metabolism of carbon and oxygen in the Glen Canyon Dam's tailwater: Results and long-term implications*- Dick Marzolf, US Geological Survey
1:20-1:40	*Carbon and oxygen dynamics in the Glen Canyon Dam's tailwater: Processes and observations during the 1996 experimental flood* - Carl Bowser, University of Wisconsin
1:40-2:00	*Effects of experimental flooding on periphyton and macroinvertebrates in Glen Canyon Dam tailwaters*- Ted McKinney, Arizona Game and Fish Department
2:00-2:20	*Experimental flooding and Rainbow Trout in Glen Canyon Dam tailwaters*- Roland Rogers, Arizona Game and Fish Department
2:20-2:40	*Drift studies* - Joe Shannon, Northern Arizona University
2:40 - 2:50	Break
	Backwaters
2:50-3:10	*Flood-induced backwater rejuvenation along the dam-controlled Colorado River, Glen and Grand Canyons, Arizona* - Larry Stevens, Applied Technologies Associates, Inc.
3:10-3:30	*Geohydrology and Geochemistry* - Rod Parnell and Abe Springer, Northern Arizona University
3:30-3:50	*The effects of the 1996 experimental Beach/Habitat-Building flood in the Colorado River, Grand Canyon, fishes, invertebrates, and their backwater habitats* - Tim Hoffnagle, Arizona Game and Fish Department
	Fishes
3:50-4:10	*The Great Flood of 1996: Response by native and non-native fishes in Western Grand Canyon* - William Leibfried, SWCA, Inc. for the Hualapai Tribe
4:10-4:30	*Effects of an experimental flood on fish and backwaters in the Colorado River, Grand Canyon, Arizona* - Rich Valdez, Bio/West, Inc.
4:30-4:50	*Response of Flannelmouth Sucker in the Paria River to an experimental spike flow in the Colorado River below Glen Canyon Dam* - Carole McIvor, University of Arizona

Wednesday, April 9, 1997

San Francisco Ballroom

TERRESTRIAL SYSTEM COMPONENT
Barry Gold, Session Chairperson

Terrestrial Biology

8:00 - 8:15 *Effects of the 1996 Beach/Habitat-Building Flows on vegetation, seed banks, organic debris, and germination sites* - Mike Kearsley, Northern Arizona University

8:15 - 8:30 *The river runs to Mile 254* - Kerry Christensen, Hualapai Tribe

8:30-8:50 *Effects of experimental high flows on the biota of Glen Canyon National Recreation Area* - John Spence, National Park Service, Glen Canyon National Recreation Area

8:50-9:10 *Partners in Slime – Kanab Ambersnail* - Vicky Meretsky, Indiana University

9:10-9:30 *Avian monitoring/Southwestern Willow Flycatcher* - Larry Stevens, ATA and Mark Sogge, US Geological Survey, Biological Resource Division, Colorado Plateau Research Station

CULTURAL RECREATIONAL AND ECONOMICS COMPONENT
Ruth Lambert, Session Chairperson

Cultural Issues

9:30-9:50 *Mitigation and flood effects on cultural resources* - Jan Balsom, National Park Service, Grand Canyon National Park

9:50-10:10 *Channel margin deposit aggradation and archeological site stabilization* - Mike Yeatts, Hopi Tribe

10:10-10:30 *Ethnobotany* - Loretta Jackson, Hualapai Tribe; and Cynthia Osife, Southern Paiute Consortium

10:30 - 10:40 Break

Recreational Issues

10:40-11:00 *Campsite area changes* - Lisa Kearsley, Grand Canyon Monitoring and Research Center

11:00-11:20 *Grand Canyon River Guides' Adopt-a-Beach Program: Repeat photography and campsite assessment by river guides* - Andre Potochnik and Kate Thompson, Grand Canyon River Guides Association

11:20-11:40 *The effects of the 1996 Beach/Habitat-Building Flows on observed and reported boating accidents on the Colorado River in Grand Canyon National Park*- Linda Jalbert, National Park Service, Grand Canyon National Park

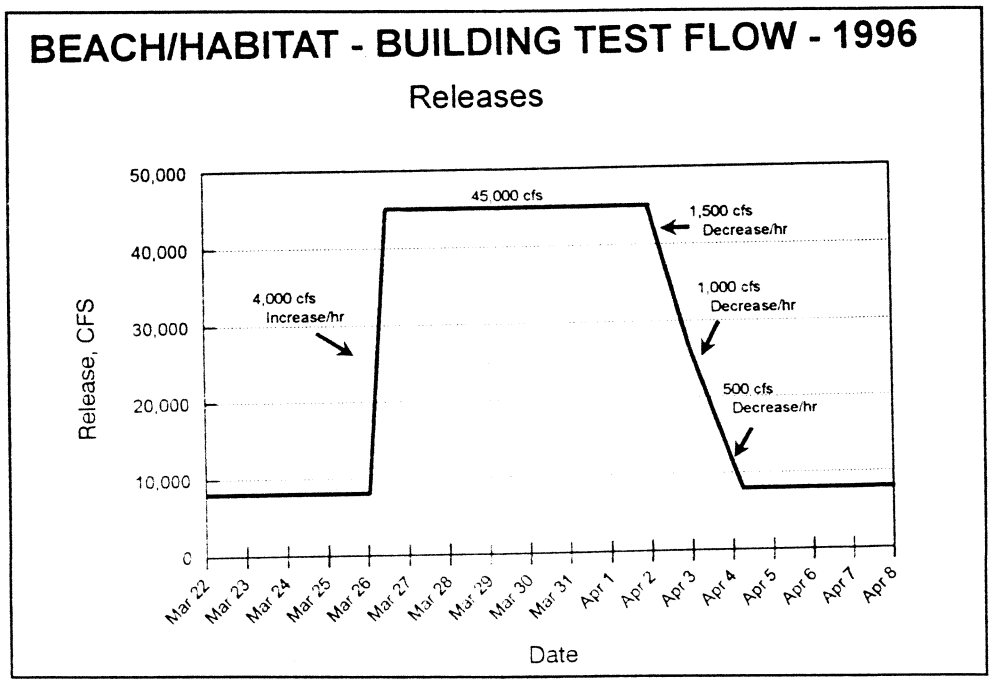
Economic Issues

11:40-12:00 *Glen Canyon Dam Beach/Habitat-Building Flow – An ex post analysis of hydropower cost* - Dave Harpman, Bureau of Reclamation

12:00 - 1:30	Lunch

EXECUTIVE SESSIONS: SYNTHESIS PREPARATION
Duncan Patten, Session Chairperson

1:30 - 5:00	**Executive Sessions: Synthesis Preparation** (Meeting rooms in left-hand column)
Meeting Rooms	
Coconino	**Reservoir impacts/Glen Canyon tailwaters** - Dick Marzolf
Canyon	**Stream flow and sediment: Hydrology, sediment transport and impacts to sediment balance** - Jim Smith
Canyon	**Stream flow and sediment: Sandbars and debris-fan reworking** - Jack Schmidt
Kaibab	**Fish and Aquatic: Non-fish aquatic biology** - Dean Blinn
Kaibab	**Fish and Aquatic: Backwaters and fishes** - Rich Valdez
Humphreys	**Terrestrial biology** -Larry Stevens
Mt. Elden	**Cultural issues** - Jan Balsom
Kachina	**Economic and recreational issues** - Dave Harpman



Thursday, April 10, 1997

San Francisco Ballroom

8:00 - 8:15	*Western Riverine Issues* - Mark Schaefer, Office of the Assistant Secretary for Water and Science, Department of the Interior
8:15 - 8:30	*The Flood Experiment: Perspectives for the future* - Dave Garrett

CORE-TOPIC SYNTHESIS PRESENTATIONS
Duncan Patten, Session Chairperson

Synthesis Group Presentations

8:30 - 8:55	**Reservoir impacts/Glen Canyon tailwaters Synthesis Group** - Dick Marzolf
8:55 - 9:20	**Stream flow and sediment: Hydrology, sediment transport/balance Synthesis Group** - Jim Smith
9:20 - 9:45	**Stream flow and sediment: Sandbars and debris-fan reworking Synthesis Group** - Jack Schmidt
9:45 - 10:10	**Fish and Aquatic: Non-fish aquatic biology Synthesis Group** - Dean Blinn
10:10 - 10:20	Break
10:20 - 10:45	**Fish and Aquatic: Fish and backwaters Synthesis Group** - Rich Valdez
10:45 - 11:10	**Terrestrial biology Synthesis Group** - Larry Stevens
11:10 - 11:35	**Cultural issues Synthesis Group** - Jan Balsom
11:35 - 12:00	**Economic and recreational issues Synthesis Group** - Dave Harpman
12:00 - 1:00	Lunch

Workshop Phase

1:00 - 1:15	*How this process works* - Duncan Patten
1:15 - 3:00	*Six Discussion Group Breakouts* - Facilitators (meeting rooms on page 10)
3:00 - 3:15	Break
3:15 - 4:25	*Discussion Group 10-minute Summaries* - Facilitators
4:25 - 4:40	*Closing Remarks* - Dave Garrett

Workshop Phase Notes

A. Importance of modifying dam operations to 'mimic' natural river flow.

Workshop Phase Notes

B. Assess the increase in knowledge base on interdependence and interactions between and among resources below Glen Canyon Dam.

Symposium Presenters

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The region is, of course, altogether valueless. It can be approached only from the south, and after entering it there is nothing to do but leave. Ours has been the first, and will doubtless be the last, party of whites to visit this profitless locality. It seems intended by nature that the Colorado River, along the greater portion of its lonely and majestic way, shall be forever unvisited and undisturbed.

Lieutenant Joseph C. Ives; *Report upon the Colorado River of the West; Explored in 1857 and 1858.*

In 1996, the Grand Canyon National Park had a total of 4,877,210 visitors.
Lieutenant Ives would have been very surprised.